Shortname: OMAEROe
Longname: OMI/Aura Multi-wavelength Aerosol Optical Depth and Single Scattering Albedo Daily L3 Global 0.25x0.25 deg Lat/Lon Grid

PFS Version: 1.0.0.1
Author(s): Peter Leonard (ADNET)

PGE Version: 1.0.0.1
Lead Algorithm Scientist: Pepijn Veefkind (KNMI)
Lead Algorithm Developer: Peter Leonard (ADNET)
Lead PGE Developer: Peter Leonard (ADNET)
PGE Developer(s): Peter Leonard (ADNET)

**Description:**

This document specifies the format of the Ozone Monitoring Instrument (OMI) OMAEROe product, which is the daily Level 3e (L3e) gridded data product that corresponds to the OMAERO product. The latter is the aerosol orbital Level 2 (L2) swath data product of the OMI KNMI Group (Reference 1). The "e" at the end of "OMAEROe" represents "expanded".

The adopted L3e grid is a 0.25-degree by 0.25-degree grid in longitude and latitude. The dimensions of this grid are 1440 by 720.
The grid cell at coordinates (1, 1)
is centered at (longitude = -179.875 , latitude = -89.875),
and the grid cell at coordinates (1440, 720)
is centered at (longitude = 179.875 , latitude = 89.875).
The center of the grid
is located at (longitude = 0.000 , latitude = 0.000),
and corresponds to the corners of four grid cells.

The adopted L3e grid is consistent with the document entitled "Definition of OMI Grids for Level 3 and Level 4 Data Products" by J.P. Veefkind et al. (Reference 2).

Each grid cell in the L3e product contains the data for the L2 observation that overlaps with the L3e grid cell which has the shortest path length [path length = 1/cos(solar zenith angle) + 1/cos(viewing zenith angle)].

The overlap between an L2 observation and an L3e grid cell is determined in a manner consistent with the document entitled "Total Ozone Mapping Spectrometer (TOMS) Level-3 Data Products User's Guide" by R. McPeters et al. (Reference 5).

An L2 observation can be mapped onto more than one L3e grid cell, if the L2 observation overlaps with and has the shortest path length for more than one L3e grid cell.

The L2 data are not averaged or weighted in any way in the L3e product.

The L3e product currently excludes L2 data collected in spatial and spectral zoom modes.

The L3e product is stored as one HDF-EOS 5 grid file, and has a size of 7 MB.

The format of the L3 product files is consistent with the document entitled
"A File Format for Satellite Atmospheric Chemistry Data" by C. Craig et al.
(Reference 3).

**Global Metadata:**

- Metadata Name: EndUTC
Mandatory: T
Data Type: HE5T_NATIVE_CHAR
Number of Values: 1
Data Source: PGE
Description: >
UTC at the end of the L3e granule in "YYYY-MM-DDT23:59:59.999999Z" format.

- Metadata Name: GranuleDay
Mandatory: T
Data Type: HE5T_NATIVE_INT
Number of Values: 1
Minimum Value: 1
Maximum Value: 31
Data Source: PGE
Description: The day of the month at the start of the L3e granule.

- Metadata Name: GranuleDayOfYear
Mandatory: T
Data Type: HE5T_NATIVE_INT
Number of Values: 1
Minimum Value: 1
Maximum Value: 366
Data Source: PGE
Description: The day of the year at the start of the L3e granule.

- Metadata Name: GranuleMonth
Mandatory: T
Data Type: HE5T_NATIVE_INT
Number of Values: 1
Minimum Value: 1
Maximum Value: 12
Data Source: PGE
Description: The month of the year at the start of the L3e granule.

- Metadata Name: GranuleYear
Mandatory: T
Data Type: HE5T_NATIVE_INT
Number of Values: 1
Minimum Value: 2000
Maximum Value: 2099
Data Source: PGE
Description: The (four-digit) year at the start of the L3e granule.

- Metadata Name: HDFEOSVersion
Mandatory: T
Data Type: HE5T_NATIVE_CHAR
Number of Values: 1
Data Source: HE

Description:
The version of HDF-EOS 5 used in production. Example is "HDFEOS_5.1.9".

- Metadata Name: InstrumentName
Mandatory: T
Data Type: HE5T_NATIVE_CHAR
Number of Values: 1
Valids: OMI
Data Source: PGE
Description: Actual is "OMI" (see Section 6.1 of Reference 3).

- Metadata Name: OrbitNumber
Mandatory: T
Data Type: HE5T_NATIVE_INT
Number of Values: 1,60
Minimum Value: 1
Maximum Value: 999999
Data Source: L2G
Description: The OMI orbit number for each L2 input granule.

- Metadata Name: OrbitPeriod
Mandatory: T
Data Type: HE5T_NATIVE_DOUBLE
Number of Values: 1,60
Minimum Value: 5000.0
Maximum Value: 7000.0
Data Source: L2G
Description: The Aura orbital period for each L2 input granule.

- Metadata Name: Period
Mandatory: T
Data Type: HE5T_NATIVE_CHAR
Number of Values: 1
Valids: Daily,Weekly,Monthly
Data Source: PGE
Description: The duration of the L3e granule. Actual is "Daily".

- Metadata Name: PGEVersion
Mandatory: T
Data Type: HE5T_NATIVE_CHAR
Number of Values: 1
Data Source: PCF
Description: Example is "1.0.0.1" (see Appendix K of Reference 4).

- Metadata Name: ProcessLevel
Mandatory: T
Data Type: HE5T_NATIVE_CHAR
Number of Values: 1
Valids: 3e
Data Source: PGE
Description: Actual is "3e".

- Metadata Name: StartUTC
Mandatory: T
Data Type: HE5T_NATIVE_CHAR

Number of Values: 1
Data Source: PGE
Description: >
UTC at the start of the L3e granule in "YYYY-MM-DDT00:00:00.000000Z" format.

- Metadata Name: TAI93At0zOfGranule
Mandatory: T
Data Type: HE5T_NATIVE_DOUBLE
Number of Values: 1
Minimum Value: 0.0
Maximum Value: 1.0e+30
Data Source: PGE
Description: >
The TAI93 time at 0z of the L3e granule (see Section 6.1 of Reference 3).

**Grid Metadata:**

- Metadata Name: GCTPProjectionCode
Mandatory: T
Data Type: HE5T_NATIVE_INT
Number of Values: 1
Minimum Value: 0
Maximum Value: 99
Data Source: PGE
Description: >
The GCTP projection code of the L3e grid. Actual is 0, which corresponds
to the geographic projection.

- Metadata Name: GridName
Mandatory: T
Data Type: HE5T_NATIVE_CHAR
Number of Values: 1
Valids: ColumnAmountAerosol
Data Source: PGE
Description: Actual is "ColumnAmountAerosol".

- Metadata Name: GridOrigin
Mandatory: T
Data Type: HE5T_NATIVE_CHAR
Number of Values: 1
Valids: Center
Data Source: PGE
Description: >
The origin of the L3e grid. Actual is "Center" (see Section 6.2 of
Reference 3).

- Metadata Name: GridSpacing
Mandatory: T
Data Type: HE5T_NATIVE_CHAR
Number of Values: 1
Data Source: PGE
Description: >
Spacing of L3e grid (in degrees). Actual is "(0.25,0.25)".

- Metadata Name: GridSpacingUnit

Mandatory: T
Data Type: HE5T_NATIVE_CHAR
Number of Values: 1
Valids: deg
Data Source: PGE
Description: >
Unit for GridSpacing. Actual is "deg".

- Metadata Name: GridSpan
Mandatory: T
Data Type: HE5T_NATIVE_CHAR
Number of Values: 1
Data Source: PGE
Description: >
Span of L3e grid (in degrees). Actual is "(-180,180,-90,90)".

- Metadata Name: GridSpanUnit
Mandatory: T
Data Type: HE5T_NATIVE_CHAR
Number of Values: 1
Valids: deg
Data Source: PGE
Description: >
Unit for GridSpan. Actual is "deg".

- Metadata Name: NumberOfLatitudesInGrid
Mandatory: T
Data Type: HE5T_NATIVE_INT
Number of Values: 1
Minimum Value: 1
Maximum Value: 720
Data Source: PGE
Description: The number of latitude bins in the L3e grid.

- Metadata Name: NumberOfLongitudesInGrid
Mandatory: T
Data Type: HE5T_NATIVE_INT
Number of Values: 1
Minimum Value: 1
Maximum Value: 1440
Data Source: PGE
Description: The number of longitude bins in the L3e grid.

- Metadata Name: Projection
Mandatory: T
Data Type: HE5T_NATIVE_CHAR
Number of Values: 1
Valids: Geographic
Data Source: PGE
Description: >
The map projection of the L3e grid. Actual is "Geographic" (see
Section 6.2 of Reference 3).

- Metadata Name: WavelDiagnostic
Mandatory: T

Data Type: HE5T_NATIVE_CHAR
Number of Values: 1
Valids: "342.5, 388.0, 442.0, 463.0, 483.5"
Data Source: PGE
Description: >
The diagnostic wavelengths in nm. Actual is "342.5, 388.0, 442.0, 463.0, 483.5".

Grid Dimensions:

- Dimension Name: XDim
Data Type: HE5T_NATIVE_INT
Dimension Type: FIXED
Number of Values: 1
Minimum Value: 1
Maximum Value: 1440
Data Source: PGE
Description: >
The longitudes dimension of the L3e grid. There are currently 1440 0.25-degree-wide bins between longitudes -180.0 and 180.0 degrees.

- Dimension Name: YDim
Data Type: HE5T_NATIVE_INT
Dimension Type: FIXED
Number of Values: 1
Minimum Value: 1
Maximum Value: 720
Data Source: PGE
Description: >
The latitudes dimension of the L3e grid. There are currently 720 0.25-degree-wide bins between latitudes -90.0 and 90.0 degrees.

- Dimension Name: nWavelDiagnostic
Data Type: HE5T_NATIVE_INT
Dimension Type: FIXED
Number of Values: 1
Minimum Value: 1
Maximum Value: 9
Data Source: PGE
Description: >
The number of diagnostic wavelengths dimension of the L2G grid. The size of this dimension is currently set at 5.

**Geolocation Fields:**

- Field Name: Latitude
Data Type: HE5T_NATIVE_FLOAT
Dimensions: YDim,XDim
Minimum Value: -90.0
Maximum Value: 90.0
Missing Value: -1.2676506e+30
Offset: 0.0
Scale Factor: 1.0
Units: deg
Data Source: L2G

Title: Latitude of the center of the groundpixel
Unique Field Definition: Aura-Shared
Description: >
The geodetic latitude (in degrees) on the ground at the center of the
L3e grid cell.

- Field Name: Longitude
Data Type: HE5T_NATIVE_FLOAT
Dimensions: YDim,XDim
Minimum Value: -180.0
Maximum Value: 180.0
Missing Value: -1.2676506e+30
Offset: 0.0
Scale Factor: 1.0
Units: deg
Data Source: L2G
Title: Longitude of the center of the groundpixel
Unique Field Definition: Aura-Shared
Description: >
The geodetic longitude (in degrees) on the ground at the center of the
L3e grid cell.

- Field Name: SolarZenithAngle
Data Type: HE5T_NATIVE_FLOAT
Dimensions: YDim,XDim
Minimum Value: 0.0
Maximum Value: 180.0
Missing Value: -1.2676506e+30
Offset: 0.0
Scale Factor: 1.0
Units: deg
Data Source: L2G
Title: >
Solar zenith angle at WGS84 ellipsoid for center co-ordinate of the ground
pixel
Unique Field Definition: Aura-Shared
Description: >
The solar zenith angle (in degrees) on the ground at the center of the L2
candidate scene with the shortest path length in each L3e grid cell.

- Field Name: ViewingZenithAngle
Data Type: HE5T_NATIVE_FLOAT
Dimensions: YDim,XDim
Minimum Value: 0.0
Maximum Value: 180.0
Missing Value: -1.2676506e+30
Offset: 0.0
Scale Factor: 1.0
Units: deg
Data Source: L2G
Title: >
Viewing zenith angle at WGS84 ellipsoid for center co-ordinate of the ground
pixel
Unique Field Definition: OMI-Specific
Description: >

The viewing zenith angle (in degrees) on the ground at the center of the L2 candidate scene with the shortest path length in each L3e grid cell.

**Data Fields:**

- Field Name: AbsorbingAerosolOpticalThicknessMW
Data Type: HE5T_NATIVE_INT16
Dimensions: nWavelDiagnostic,YDim,XDim
Minimum Value: -32766
Maximum Value: 32768
Missing Value: -32767
Offset: 0.0
Scale Factor: 0.001
Units: NoUnits
Data Source: L2G
Title: >
Spectral Absorbing Aerosol Optical Thickness for best fit aerosol model derived with the Multi-Wavelength method, scaled by a factor 1000
Unique Field Definition: OMI-Specific
Description: >
The spectral absorbing aerosol optical thickness
= (1.0 - SingleScatteringAlbedoMW) * AerosolOpticalThicknessMW
for best fit aerosol model derived with the multi-wavelength method, scaled by a factor 1000 for the L2 candidate scene with the shortest path length in each L3e grid cell.

- Field Name: AerosolModelMW
Data Type: HE5T_NATIVE_UINT16
Dimensions: YDim,XDim
Minimum Value: 0
Maximum Value: 65534
Missing Value: 65535
Offset: 0.0
Scale Factor: 1.0
Units: NoUnits
Data Source: L2G
Title: >
Aerosol model indicator for best fit aerosol model derived with the Multi-Wavelength method
Unique Field Definition: OMI-Specific
Description: >
The aerosol model indicator for best fit aerosol model derived with the multi-wavelength method for the L2 candidate scene with the shortest path length in each L3e grid cell.

- Field Name: AerosolOpticalThicknessMW
Data Type: HE5T_NATIVE_INT16
Dimensions: nWavelDiagnostic,YDim,XDim
Minimum Value: -32766
Maximum Value: 32768
Missing Value: -32767
Offset: 0.0
Scale Factor: 0.001
Units: NoUnits
Data Source: L2G

Title: >
Spectral Aerosol Optical Thickness for best fit aerosol model derived with the Multi-Wavelength method, scaled by a factor 1000
Unique Field Definition: OMI-Specific
Description: >
The spectral aerosol optical thickness for best fit aerosol model derived with the multi-wavelength method, scaled by a factor 1000, for the L2 candidate scene with the shortest path length in each L3e grid cell.

- Field Name: AerosolOpticalThicknessPassedThresholdMean
Data Type: HE5T_NATIVE_INT16
Dimensions: YDim,XDim
Minimum Value: -32766
Maximum Value: 32768
Missing Value: -32767
Offset: 0.0
Scale Factor: 0.001
Units: NoUnits
Data Source: L2G
Title: >
Mean spectral Aerosol Optical Thickness of aerosol models that passed the threshold, scaled by a factor 1000
Unique Field Definition: OMI-Specific
Description: >
The mean spectral aerosol optical thickness at 483.5 nm of aerosol models that passed the threshold, scaled by a factor 1000, for the L2 candidate scene with the shortest path length in each L3e grid cell.

- Field Name: AerosolOpticalThicknessPassedThresholdStd
Data Type: HE5T_NATIVE_INT16
Dimensions: YDim,XDim
Minimum Value: -32766
Maximum Value: 32768
Missing Value: -32767
Offset: 0.0
Scale Factor: 0.001
Units: NoUnits
Data Source: L2G
Title: >
Standard deviation of the spectral Aerosol Optical Thickness of aerosol models that passed the threshold, scaled by a factor 1000
Unique Field Definition: OMI-Specific
Description: >
The standard deviation of the spectral aerosol optical thickness at 483.5 nm of aerosol models that passed the threshold, scaled by a factor 1000, for the L2 candidate scene with the shortest path length in each L3e grid cell.

- Field Name: SingleScatteringAlbedoMW
Data Type: HE5T_NATIVE_INT16
Dimensions: nWavelDiagnostic,YDim,XDim
Minimum Value: -32766
Maximum Value: 32768
Missing Value: -32767
Offset: 0.0
Scale Factor: 0.001

Units: NoUnits
Data Source: L2G
Title: >
Spectral Single Scattering Albedo for best fit aerosol model derived
with the Multi-Wavelength method, scaled by a factor 1000
Unique Field Definition: OMI-Specific
Description: >
The spectral single scattering albedo for best fit aerosol model derived
with the Multi-Wavelength method, scaled by a factor 1000 for the L2
candidate scene with the shortest path length in each L3e grid cell.

- Field Name: SingleScatteringAlbedoPassedThresholdMean
Data Type: HE5T_NATIVE_INT16
Dimensions: YDim,XDim
Minimum Value: -32766
Maximum Value: 32768
Missing Value: -32767
Offset: 0.0
Scale Factor: 0.001
Units: NoUnits
Data Source: L2G
Title: >
Mean spectral Single Scattering Albedo of aerosol models that passed the
threshold, scaled by a factor 1000
Unique Field Definition: OMI-Specific
Description: >
The mean spectral single scattering albedo at 483.5 nm of aerosol models
that passed the threshold, scaled by a factor 1000, for the L2 candidate
scene with the shortest path length in each L3e grid cell.

- Field Name: SingleScatteringAlbedoPassedThresholdStd
Data Type: HE5T_NATIVE_INT16
Dimensions: YDim,XDim
Minimum Value: -32766
Maximum Value: 32768
Missing Value: -32767
Offset: 0.0
Scale Factor: 0.001
Units: NoUnits
Data Source: L2G
Title: >
Standard deviation of the spectral Single Scattering Albedo of aerosol
models that passed the threshold, scaled by a factor 1000
Unique Field Definition: OMI-Specific
Description: >
The standard deviation of the spectral single scattering albedo at 483.5 nm
of aerosol models that passed the threshold, scaled by a factor 1000, for
the L2 candidate scene with the shortest path length in each L3e grid cell.

- Field Name: TerrainReflectivity
Data Type: HE5T_NATIVE_INT16
Dimensions: YDim,XDim
Minimum Value: -32766
Maximum Value: 32768
Missing Value: -32767

Offset: 0.0
Scale Factor: 0.001
Units: NoUnits
Data Source: L2G
Title: >
Reflectivity of the ground pixel, scaled by a factor 1000
Unique Field Definition: OMI-Specific
Description: >
The terrain reflectivity at the center of the L2 candidate scene with the shortest path length in each L3e grid cell.

- Field Name: UVAerosolIndex
Data Type: HE5T_NATIVE_FLOAT
Dimensions: YDim,XDim
Minimum Value: -10.0
Maximum Value: 10.0
Missing Value: -1.2676506e+30
Offset: 0.0
Scale Factor: 1.0
Units: NoUnits
Data Source: L2G
Title: UV Aerosol Index
Unique Field Definition: OMI-Specific
Description: >
The UV aerosol index for the L2 candidate scene with the shortest path length in each L3e grid cell.

- Field Name: VISAerosolIndex
Data Type: HE5T_NATIVE_FLOAT
Dimensions: YDim,XDim
Minimum Value: -10.0
Maximum Value: 10.0
Missing Value: -1.2676506e+30
Offset: 0.0
Scale Factor: 1.0
Units: NoUnits
Data Source: L2G
Title: VIS Aerosol Index
Unique Field Definition: OMI-Specific
Description: >
The visual aerosol index for the L2 candidate scene with the shortest path length in each L3e grid cell.

Core Metadata: >

None.

Product Specific Attributes: >

None.

Archived Metadata: >

None.

**References:**

1. "OMAERO README File"
(2009 April 6)
(http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI/omaero_v003.shtml)

2. "Definition of OMI Grids for Level 3 and Level 4 Data Products"
(OMI-Grids_L3L4, SD-OMIE-KNMI-443, 25 January 2005)

3. "A File Format for Satellite Atmospheric Chemistry Data"
(OMI-AURA-DATA-GUIDE, ESDS-RFC-009, May 2008)

4. "OMI Science Software Delivery Guide for Version 0.9"
(OMI-SSDG-0.9.10, Version 0.9.10, 22 June 2005)

5. "Total Ozone Mapping Spectrometer (TOMS) Level-3 Data Products User's Guide"
(NASA/TM-2000-209896, July 2000)